TACOM

Lethality, Survivability, Mobility and Sustainment for America's Army

FUTURE SCOUT AND CAVALRY SYSTEM (FSCS)
AND

TACTICAL RECONNAISSANCE ARMOURED COMBAT EQUIPMENT REQUIREMENT (TRACER)
PROGRAM REVIEW
6th International Cannon Artillery Firepower Symposium & Exhibition

David Dopp
Chief Engineer, PM FSCS

21 June 00

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Outline

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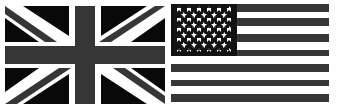
- **Background**
- **Status**
- **Key Technologies**
- **Design Drivers**
- **Summary**



Program Background

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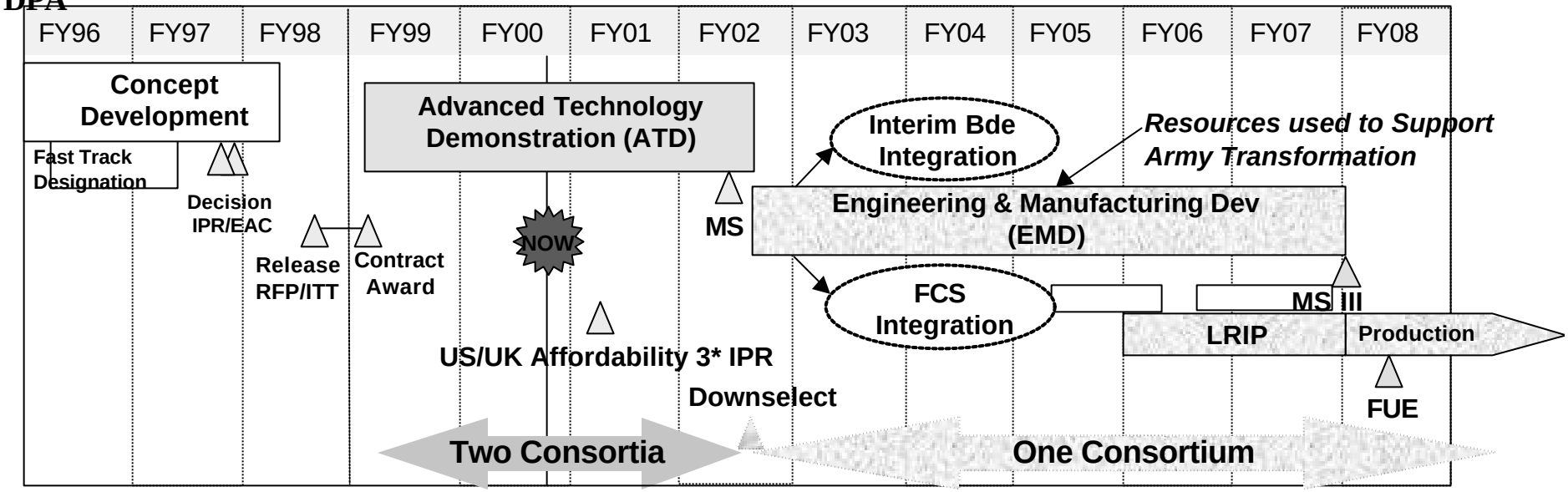

Fast Track Strategy

- Eliminate 2 Acquisition Phases
- Address Risk Reduction Early
- Address Affordability Early
- Demonstrate Program is EMD Ready

Benefits of Fast Track & UK Collaboration:

- Schedule Reduction
- Cost Avoidance

Consortia:

SIKA INTERNATIONAL

British Aerospace
Lockheed Martin
Vickers Defence Systems
General Dynamics-Land Systems

LANCER

BAE SYSTEMS
United Defense
Raytheon-TI
Alvis

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Program Status

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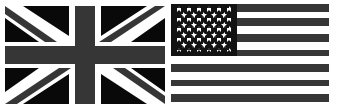
- US/UK Committed to Complete ATD Phase
- Supports US/UK Future Force:
  - Technology & Integration
    - Sensors
    - Survivability
    - C4I
    - Mobility
    - Lethality
    - C130 Integration



IPPD Implementation
TRACER/FSCS JPO Product & Process Integration

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TECHNOLOGY PRODUCT TEAMS

- SENSORS
- SURVIVABILITY
- C3I
- MOBILITY
- LETHALITY
- SUPPORTABILITY

JPO PM/DPM

SECURITY

BUS MGMT

SYSTEMS ENGINEERING & INTEGRATION

*** PROCESS TEAMS**

- ARCHITECTURE & SOFTWARE
- T&E
- TRAINING/HFE/SME
- MANUFACTURING
- MOD/SIM
- SAFETY
- RAM
- QUALITY
- CAIV/AFFORD/LCC/OA
- CONFIG MGMT

* PROCESS EXPERTISE SUPPORTS AND HORIZONTALLY INTEGRATES ACROSS PRODUCT ORIENTED TEAMS. ALL TEAM EXPERTISE WILL BE MATCHED AS APPROPRIATE TO THE CONSORTIUM TEAMS PROGRAM STRUCTURE.

Affordability Strategy

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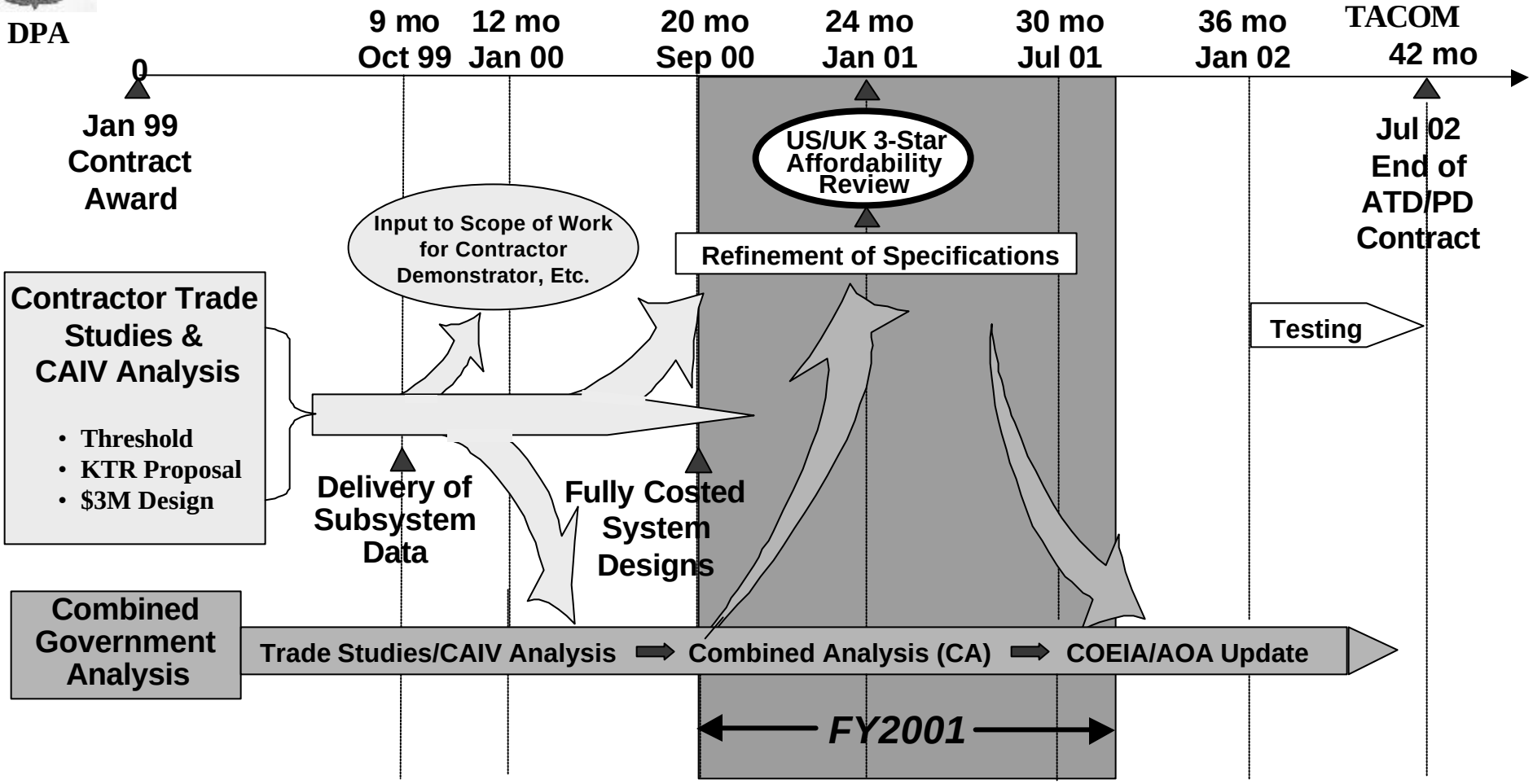

Key milestone in FY01 - US/UK 3-Star Affordability Review

FSCS Enabling Technologies for BCT/FCS

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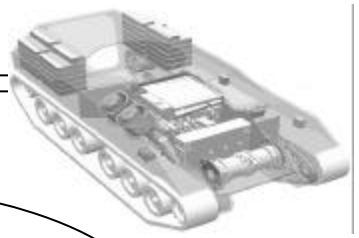
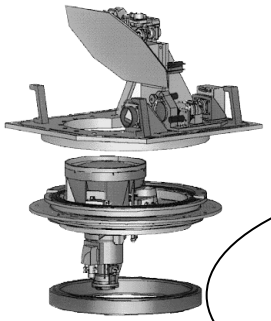
SURVIVABILITY

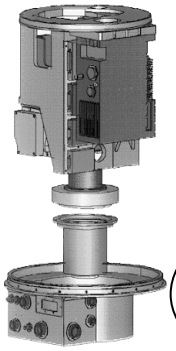
- **Signature Management**
- **Defensive Aids Suite**
- **Lightweight Composite Protection**
- **Compartmented Crew Cockpit**



SENSORS

- **Mast Mounted FLIR w/ Extended Range Optics**
- **Multi-Function Laser**
- **Acoustic Sensors**
- **Active Emitter**





MOBILITY

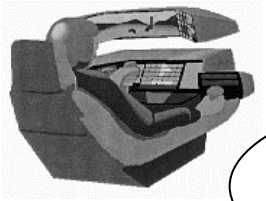
- **Electric/Conventional Drive**
- **Advanced Suspension Systems**
- **Steel/Synthetic Track (Band)**
- CTIS/Run Flat Tires

C4I/ELECTRONICS

- Advanced Crew Station
- **Open Electronic Architecture**
- Multi-band, Multi-mode Radio (JTRS /Bowman)
- Fully Integrated into Digital Battlefield

LETHALITY

- **Medium Caliber Weapon**
- Advanced Fire Control
- OCSW/Missile Combination



SYSTEM/DEPLOYABILITY

- **C130**
- Advanced Lightweight Structure
- **Modular Design for Growth & Adaptability**

SUPPORTABILITY

- Embedded Training
- ETM / IETM / BIT
- “PIT STOP” Approach
- Diagnostics/Prognostics

Emerging Survivability Concepts

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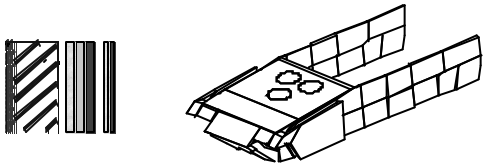
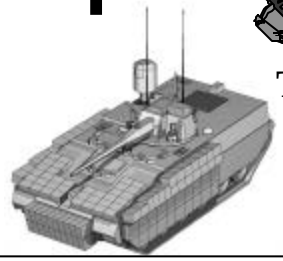
Integration Risk Reduction via:
- ☑*Survivability Demonstrators*
- ☑*Software Integration Lab Effort*





Ballistic Protection (Armor):
- *C130 Roll-On/Roll-Off*
- *Increased Modular Protection Levels*
- *Alloys, Ceramics,Composites*
- *Priority of Protection to Crew*

Detection Avoidance

Signature Management:
- *Low Cost, Low Burden*
- *Modular*
- *Full Spectrum*
- *Automotive Treatments*
- *Acoustic Treatments*

Crew Protection:
- *NBC Warning & Protection*
- *Fire Detection & Suppression*

Defensive Aids Suite:
- *Processor*
- *Warning Receiver(s)*
- *Expendables*

Hit Avoidance

Holistic and Balanced Approach to Achieving Unsurpassed Survivability in a C-130 Class Vehicle

FSCS Sensor Technologies

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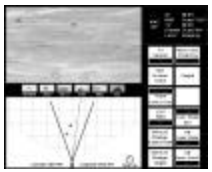
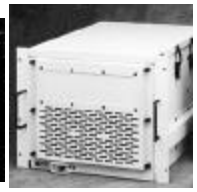
Target Acquisition ATD

MMW Radar



Flat Panel Display



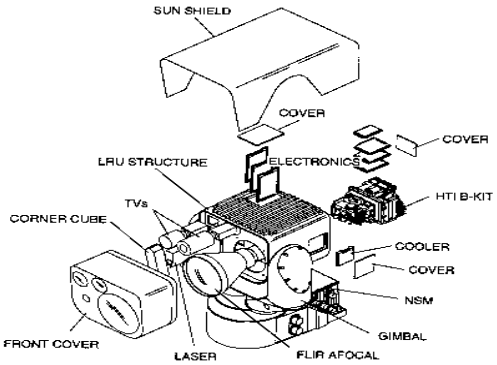
COTS ATR Processor

SENSOR CAPABILITIES

- HTI FLIR
- Extended Range Optics
- High Definition Day TV
- Multifunction Laser

Thermal Sensor
Visual Sensor
Laser
Radar
Mast
Processing

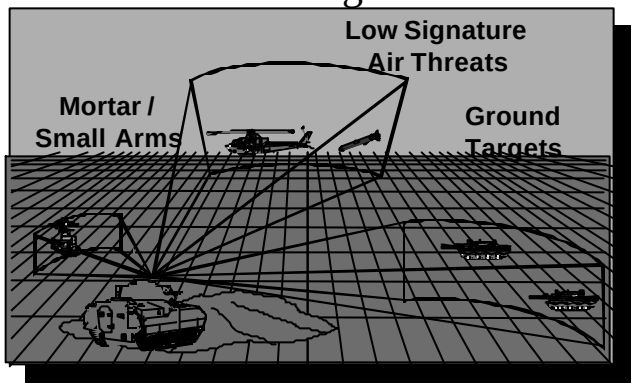
Hunter Sensor Suite ATD



SENSOR CAPABILITIES

- HTI FLIR
- Extended Range Optics
- High Definition Day TV
- Eyesafe Laser Range Finder
- Acoustic array
- Global Positioning System
- North Seeking Module (NSM)
- On-the-move stabilization
- Elevated sensor

Multifunction Staring Sensor Suite ATD



SENSOR CAPABILITIES

- Staring FLIR
- Common Optics/Processor
- Dual Waveband 3-5/8-12
- High Definition Day TV
- Multifunction Laser

UK Technology Programs

- Sensor Technologies for Affordable IR Systems Prog
- Surveillance and Target Acquisition Research Prog
- Wide Angle Surveillance & Auto Detection (WASAD)
- Man-portable STA Radar Mid Life Improvement
- Advanced Battlefield Surveillance Radar (ABSR)
- Audio Location Classification And Tracking (ALCAT)

FSCS Lethality Technologies

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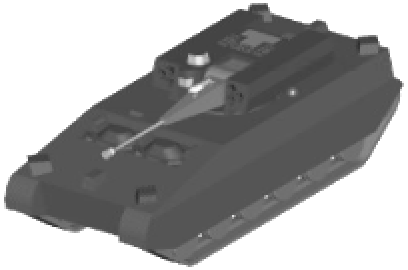
CT 2000

- Weight - 580 lb
- Length - 142.6 in.
- Ammunition weight 3.3 lb/rd
- Firing rate 1-200 rpm
- Push through rotating chamber
- Technical Approach
  - Scale-down demonstrated 45mm approach
  - Tank gun velocity and accuracy
  - 50% less parts than conventional system
  - Modular autoloader handles two round types in linkless modular design



ATGW Variant

Bushmaster III

- Weight - 480 lb
- Length - 158.1 in.
- Ammunition weight - 3.45 lb/rd
- Firing rate 1-200 rpm
- Technical Approach
  - Scale-up proven chain gun technology to 35mm
  - Leverage existing 35mm ammunition development
  - Growth potential (50mm) using CTA technology

Objective Crew Served Weapon

Emerging C4I Concept

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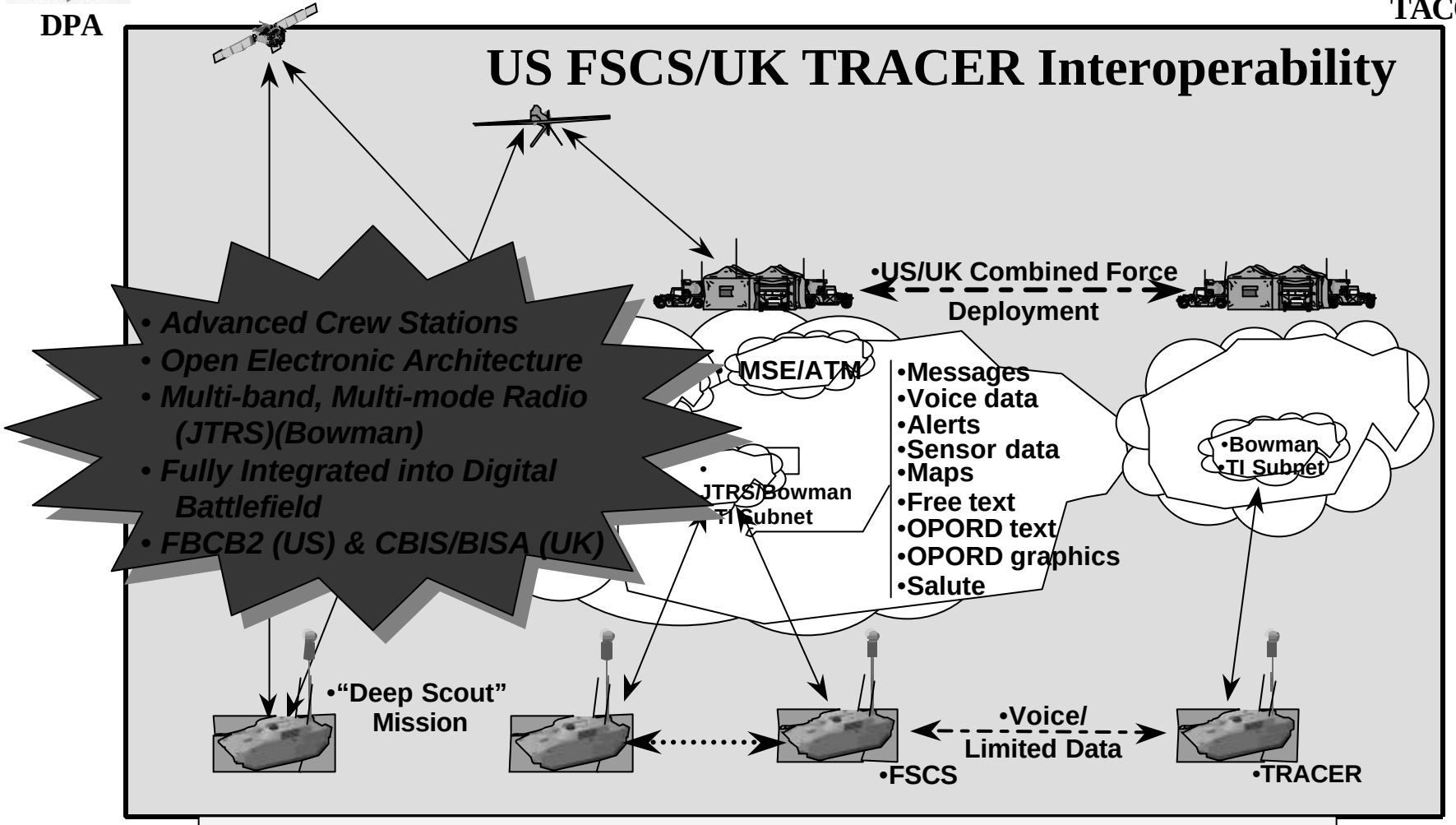

Maximize commonality between the US FSCS and UK TRACER
Interoperate/Communicate with National Networks

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Design Drivers

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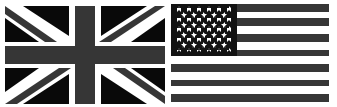
- C130 Transport
  - Wheels vs. Track
  - Level 0 Armor
  - Overall Weight
  - Internal Volume
  - Mobility (Go / No Go)
  - Acceleration & 30 mph in 12.5 secs
  - 60% Grade
- FBCB2 & BSIS, 2 radios



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Integration Challenges

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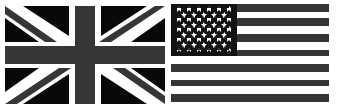
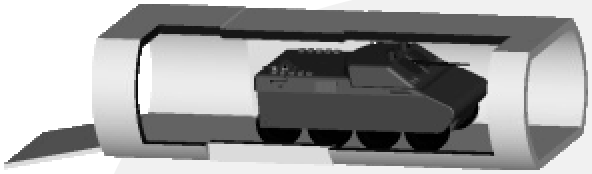
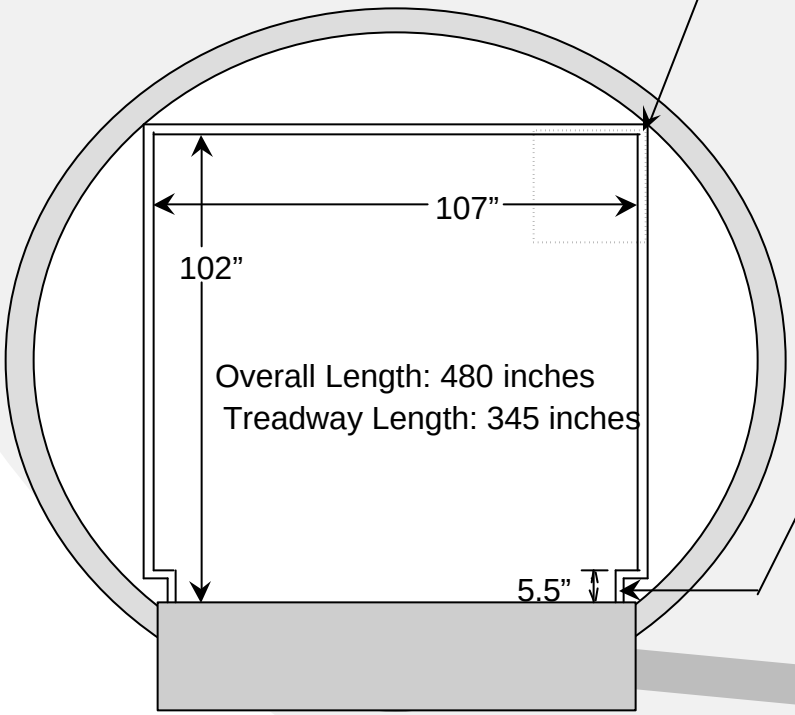
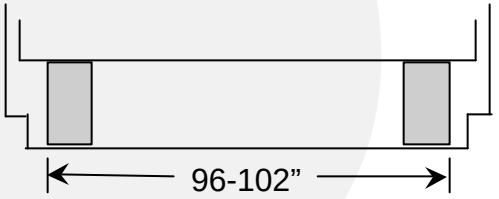
- Sensor System:
  - Data & Sensor Fusion: Surveillance Sensors, Automatic Target D/R; DAS, Weapon System etc.
- Mast Mounted Sensors:
  - Thermal Imager (Stabilized)
  - CCTV: Visual / Near IR (Stabilized)
  - Active Emitter (Stabilized)
  - LRF/LTD
- Survivability Technology:
  - Mast Mounted Sensors, Main Weapon
- C130



Strategic - C-130 Design Constraint

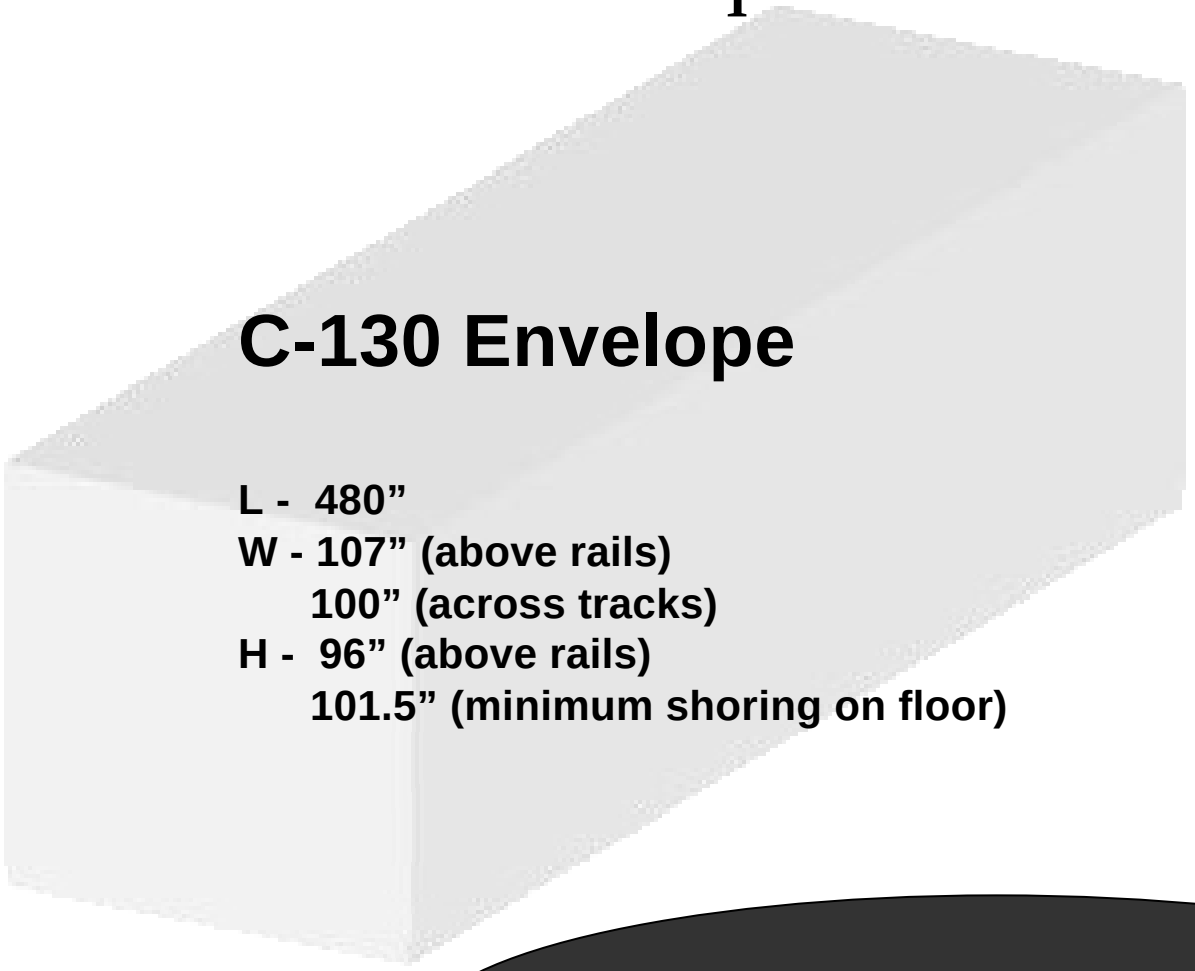






Maximum Peacetime Payload C-130H/J: 21 tons , including shoring, for 550 nautical miles. The most significant thing is that the C-130 drives vehicle design.

FSCS/TRACER User Requirements

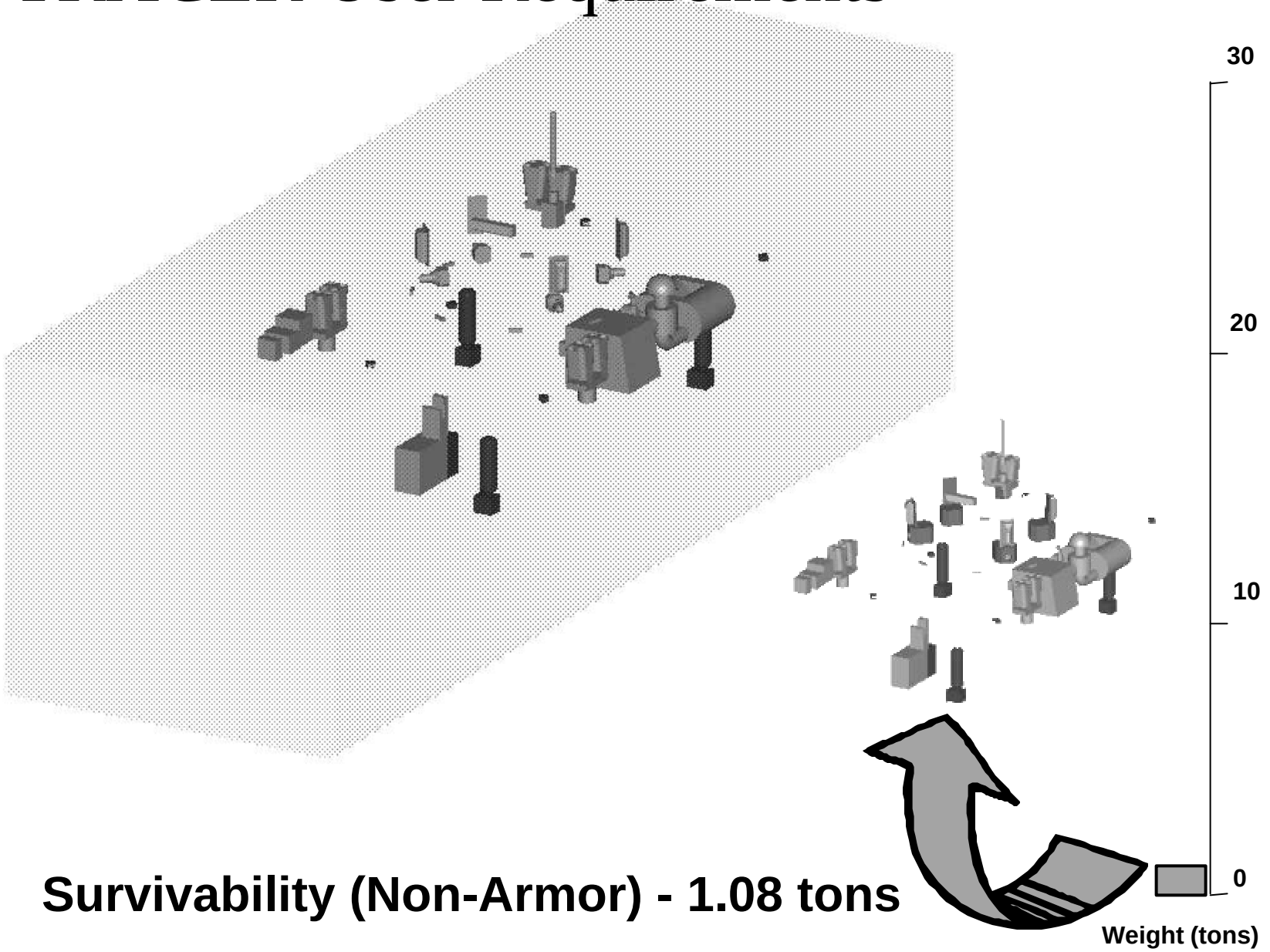


C-130 Envelope

L - 480”
W - 107” (above rails)
100” (across tracks)
H - 96” (above rails)
101.5” (minimum shoring on floor)

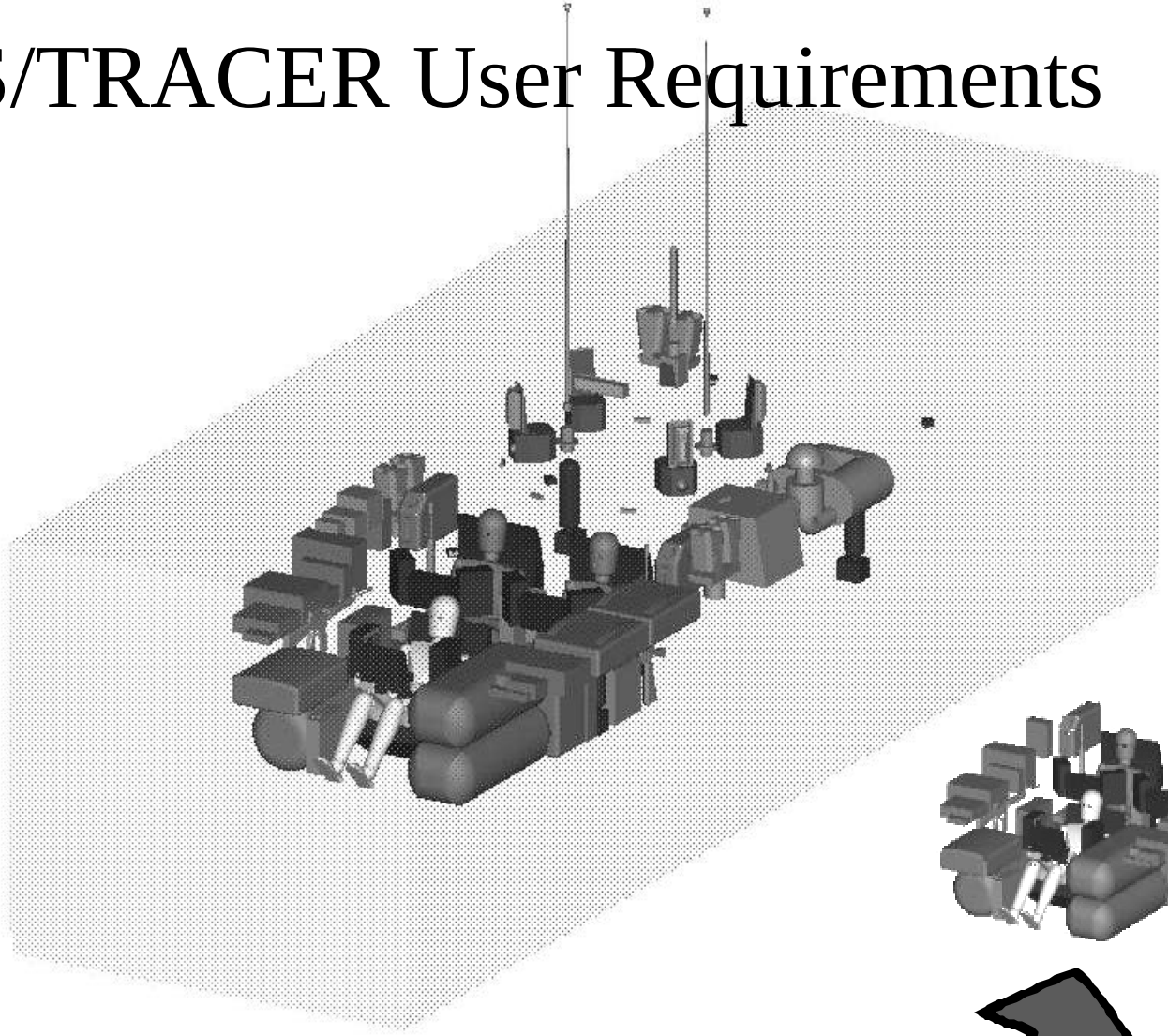
C-130 Dimensional Constraints Have a Major Impact on Vehicle Design

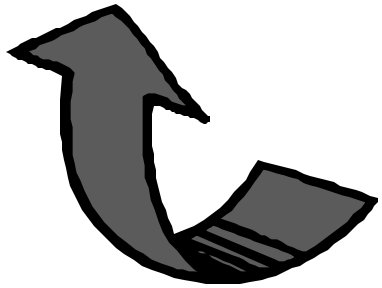
FSCS/TRACER User Requirements

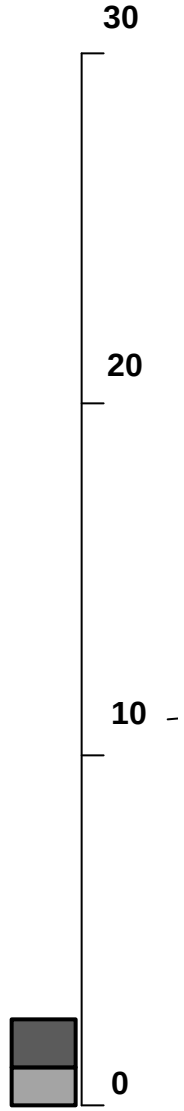


Survivability (Non-Armor) - 1.08 tons

FSCS/TRACER User Requirements

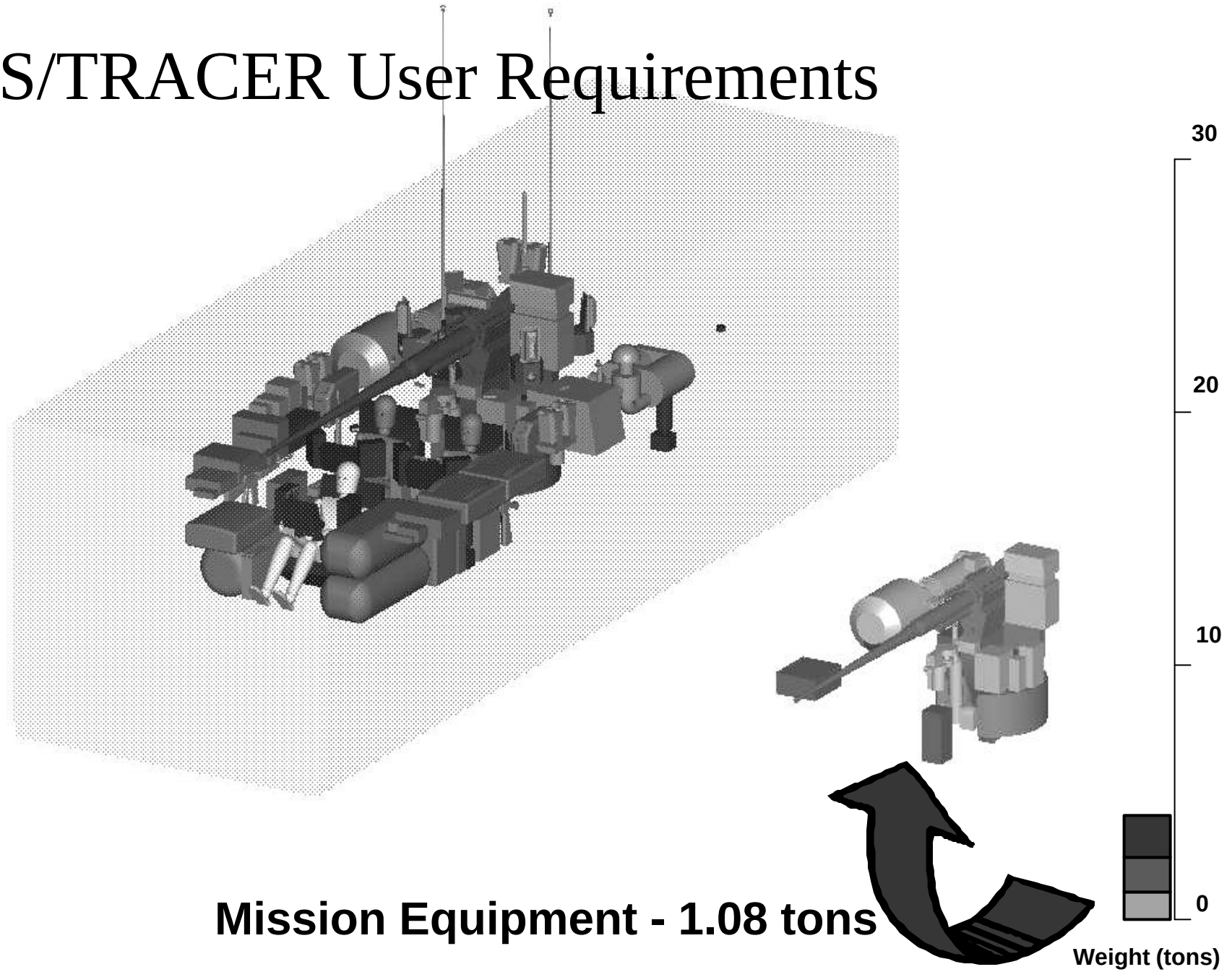






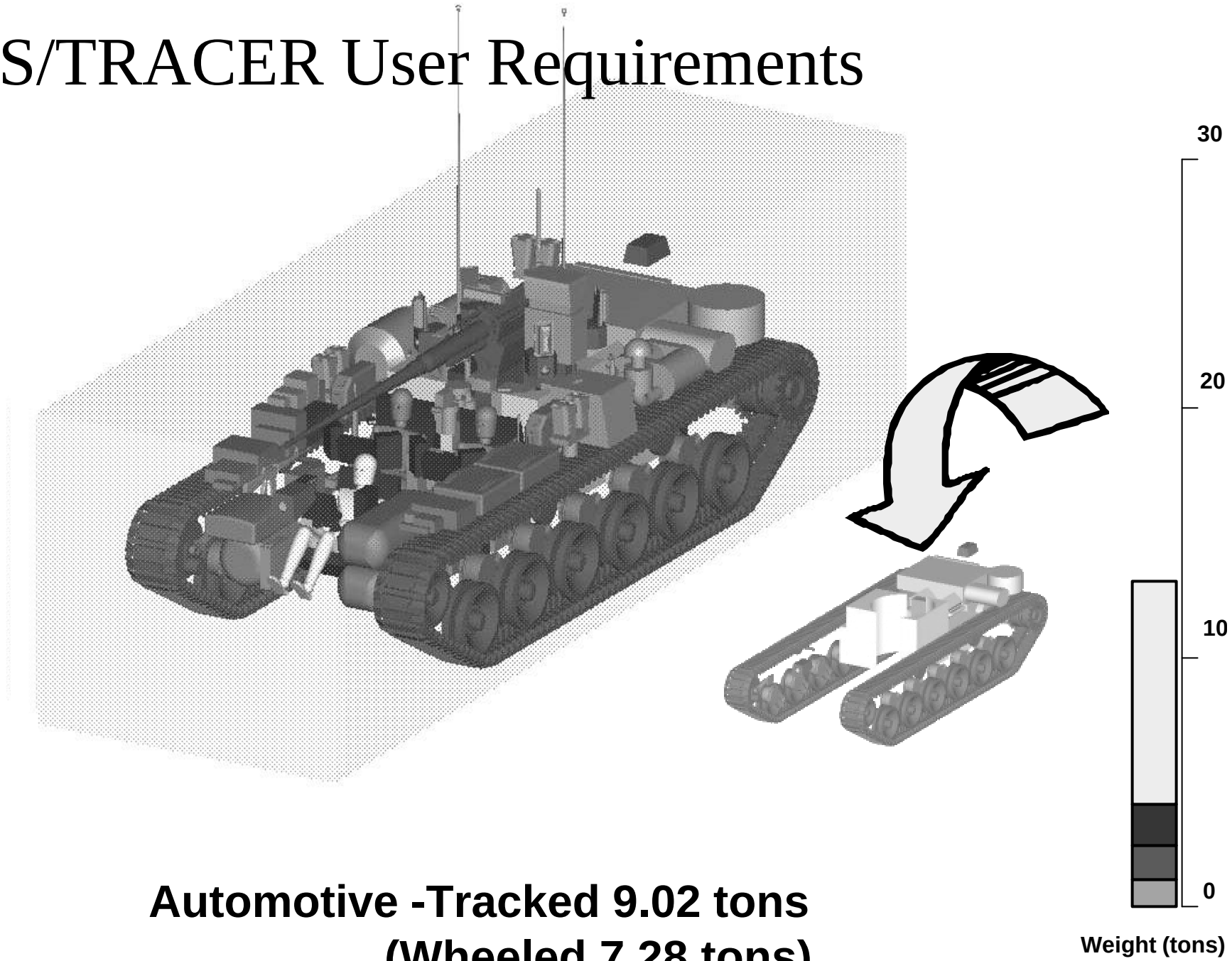
Crew - 1.40 tons

FSCS/TRACER User Requirements



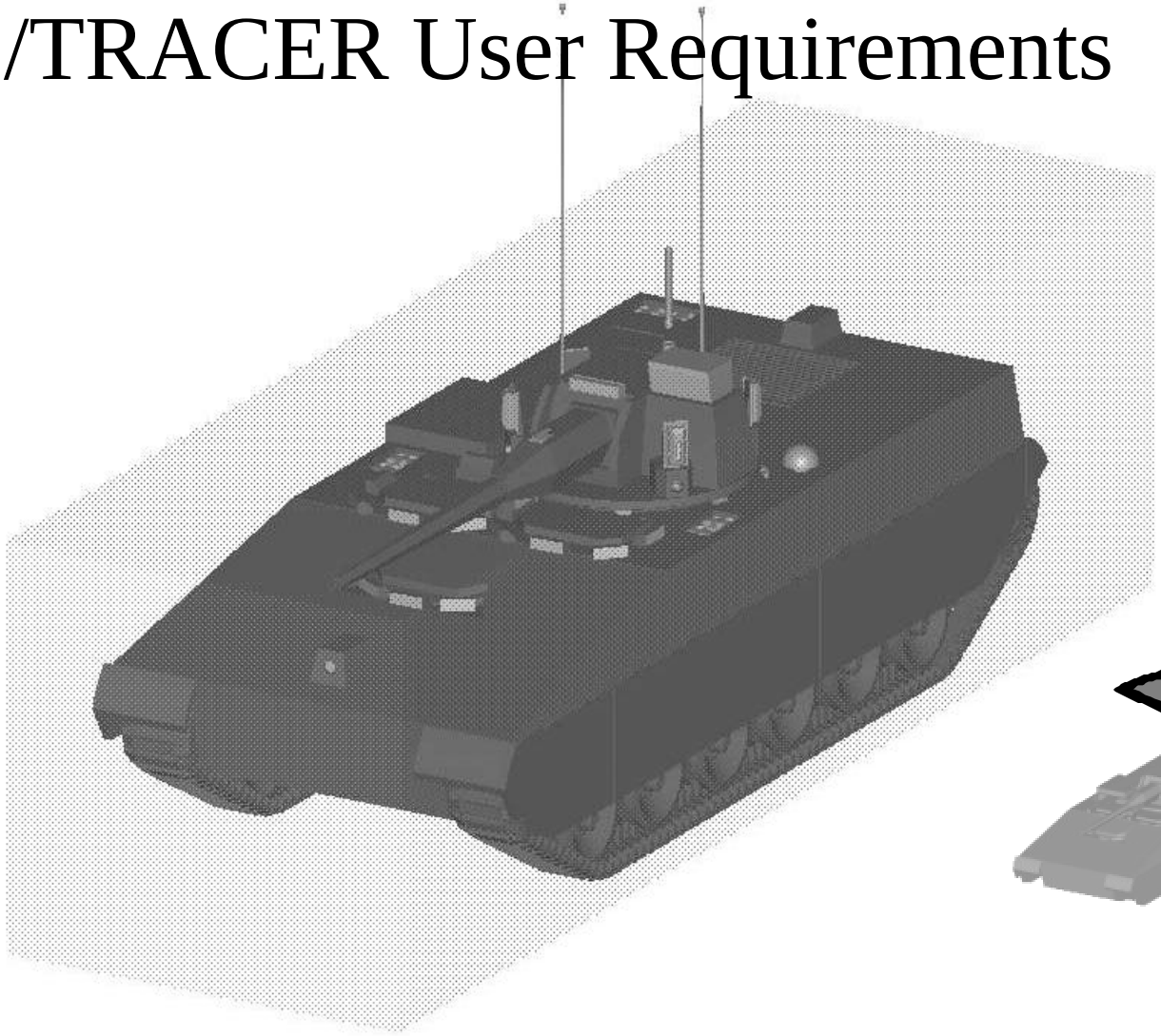
Mission Equipment - 1.08 tons

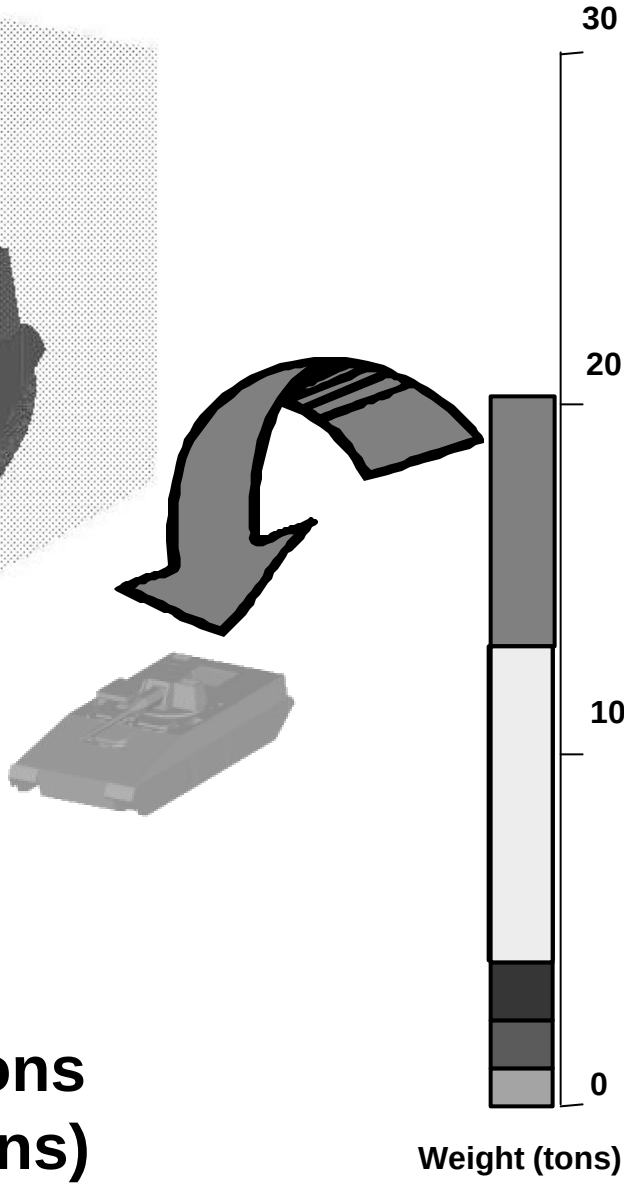
FSCS/TRACER User Requirements



Automotive -Tracked 9.02 tons
(Wheeled 7.28 tons)

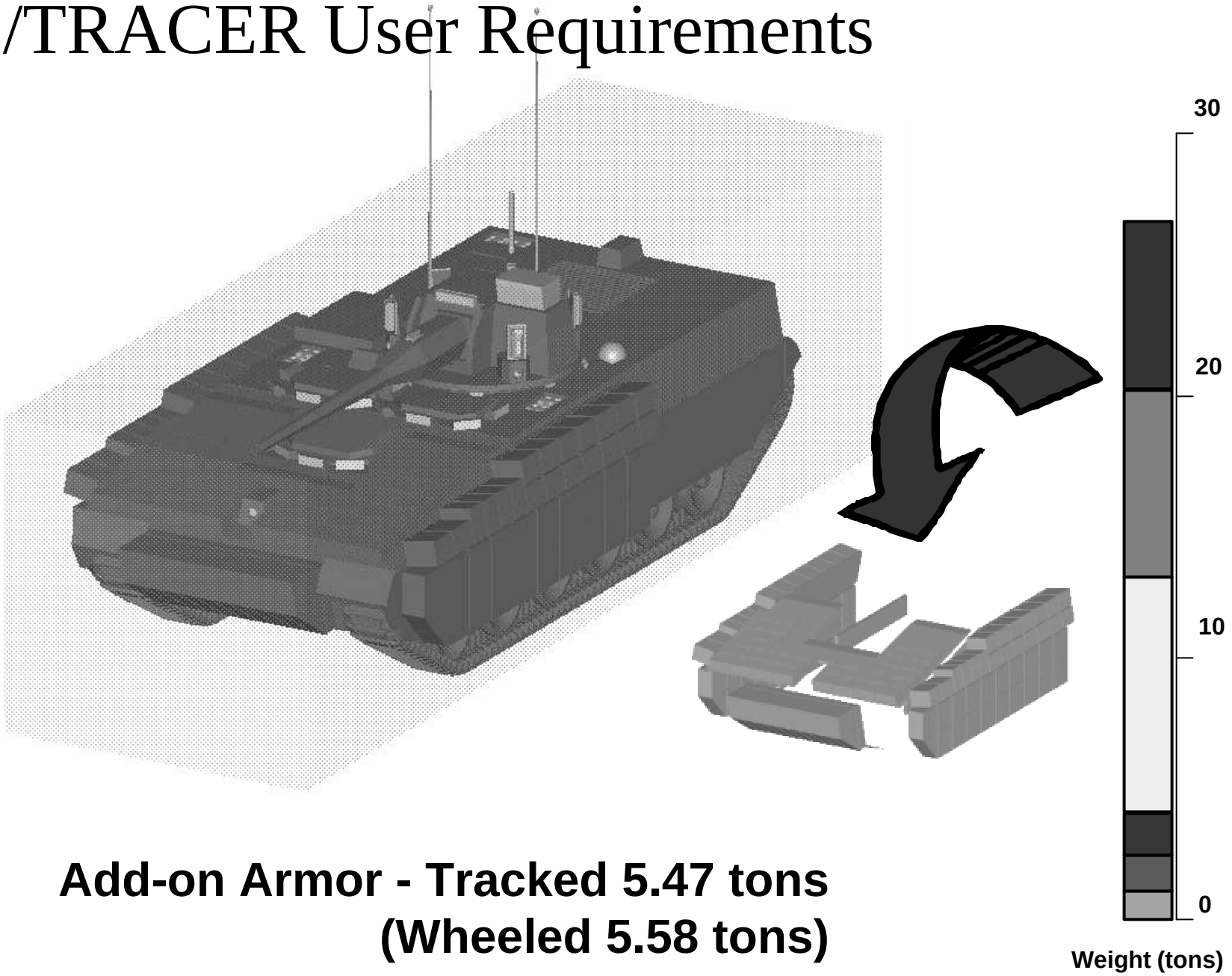
FSCS/TRACER User Requirements





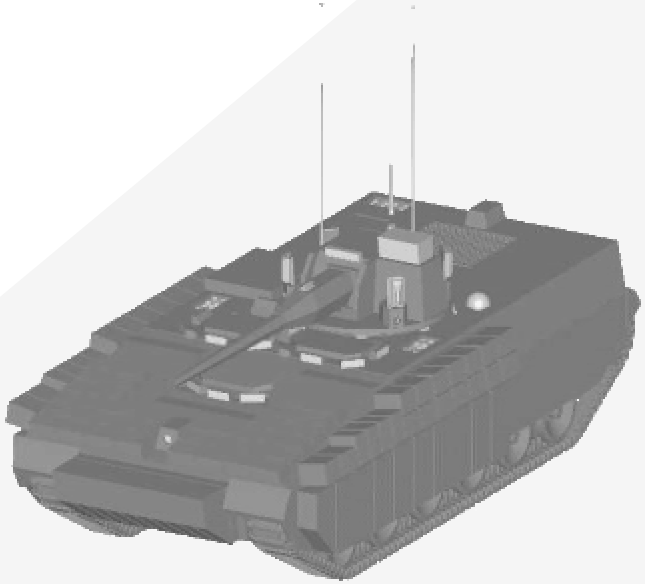
Structure/Armor - Tracked 8.21 tons
(Wheeled 8.98 tons)

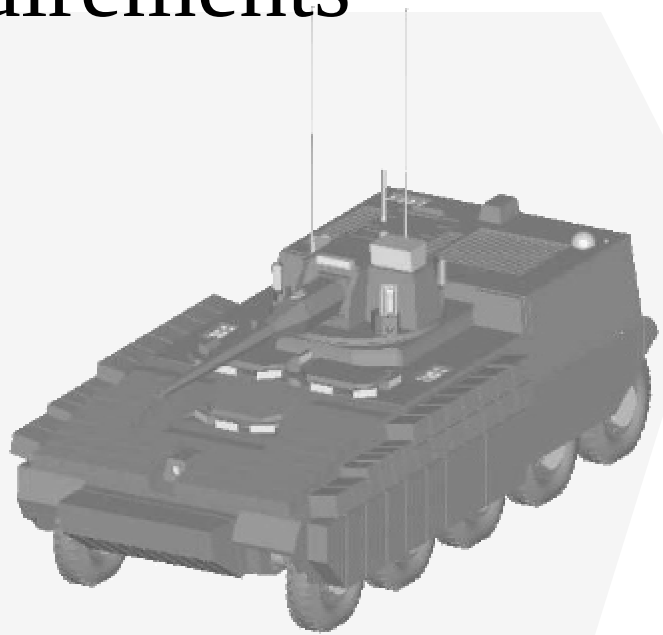
FSCS/TRACER User Requirements



Add-on Armor - Tracked 5.47 tons
(Wheeled 5.58 tons)

FSCS/TRACER User Requirements





AOA Tracked Concept		AOA Wheeled Concept
21.3 tons	Level 0	20.3 tons
24.8 tons	Level 1	23.9 tons
26.7 tons	Level 2	25.9 tons

Total Weight at Armor Levels 0, 1 and 2

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Contributing Efforts

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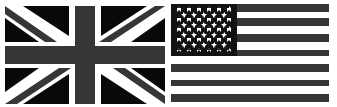
- Requirements:
  - Evaluation / Refinement / Validation
- Trade Off Analyses:
  - Subsystem & System Level (i.e. Wheel/Track)
- Technology Development & Integration (Priority via Risk Identification):
  - Virtual Prototype
  - SIL
  - Tech Demo, Integrated Survivability Demonstrator, Recce Rig
  - Integrated Demonstrator
- Design for C130



FSCS/TRACER Supports "The Army Vision"

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Responsive

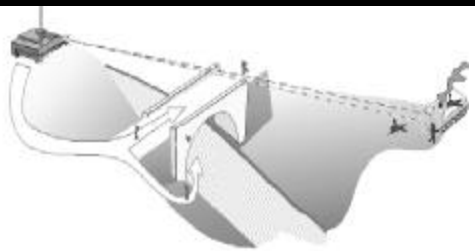
- *Rapid Power Projection*
- *Intratheater Movement Agility*

Agile

- *High Vehicular Mobility*
- *48 Hour Mission Profile Allows Rapid Mission Changes Without Logistic Umbilical*

Lethal

- *Employs Reach Back Precision Fires*
- *Self Defense Capability With Growth Potential*

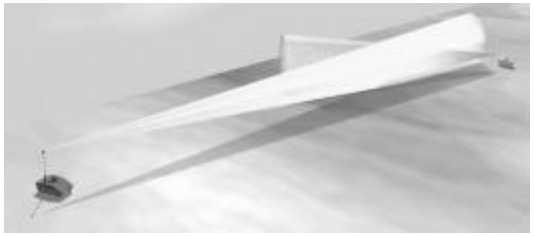


Survivable

- *Capable of Operation in Direct Proximity to Threats*
- *Holistic Combination of Sensors, Signature Management, DAS, Mobility, Lethality, and Ballistic Protection*

Versatile

- *Sensor Overmatch Provides Situational Awareness and Knowledge to Enable Rapid Reorganization or Adjustment on a Dynamic, High-tempo Battlefield*



Sustainable

- *Controls O&S Costs With Emphasis on Reliability and Maintainability*
- *Capable of Conducting Continuous Operations Over Extended Distances*